Squid Fishery Advisory Committee Meeting 1
Via Zoom Teleconference
February 9, 2023, 9am-12:30pm

KEY OUTCOMES MEMORANDUM

OVERVIEW

The Squid Fishery Advisory Committee (SFAC or Committee) held its initial meeting via Zoom teleconference on February 9, 2023. The goals of the meeting were to:

- Welcome SFAC members
- Introduce California Department of Fish and Wildlife (CDFW) staff, CONCUR facilitators, agency scientists, and SFAC members
- Provide a briefing on the SFAC Purpose & Charge
- Review Ground Rules and Meeting Protocols, consider revisions and adopt Ground Rules
- Present background on the squid fishery and introduce planned topics for discussion and deliberation
- Introduce SFAC members to the methodology of Empirical Dynamic Modeling

PARTICIPANTS

Seventeen SFAC members and one alternate member participated in the meeting including: Anna Weinstein, Anthony Vuoso, Brian Susi-Blair, Caitlin Allen Akselrud, Corbin Hanson, Dan Yoakum, David Crabbe, Greg Helms, Joe Cappuccio, Joe Villareal, Ken Bates, Ken Towsley, Mark Fina, Porter McHenry, Richie Ashley, Ryan Augello, Tom Noto and Nick Jurlin (alternate).

Katie Grady, Briana Brady, John Ugoretz, Dianna Porzio and Julia Coates with the CDFW convening team participated. Scott McCreary and Debbie Schechter with CONCUR served as neutral facilitators. Stephan Munch and Lucas Medeiros with UC Santa Cruz (UCSC) and the National Oceanic and Atmospheric Administration (NOAA) participated as scientific support. Scott Cohen of CDFW participated as a law enforcement representative.

MEETING MATERIALS

Materials provided for the meeting included:

- Agenda
- SFAC Roster and Bios

- SFAC Charge
- SFAC Ground Rules
- Summary of Planned Discussion Topics

KEY OUTCOMES

Below is a summary of the main topics and issues discussed during the SFAC meeting. This summary provides an overview of the main topics, primary points and options raised in discussions, and next steps.[1]

Welcome, Agenda Review, How to Participate, Introductions

Katie Grady, CDFW's lead for the SFAC, welcomed participants and introduced herself. Facilitators Scott McCreary and Debbie Schechter gave introductions, noting that their role is to support the SFAC's process and deliberations. CDFW staff members Briana Brady, John Ugoretz, Dianna Porzio, and Julia Coates also introduced themselves. Julia will be providing support as a scientific advisor to this process.

SFAC members introduced themselves, noting their organization and/or connection to the California market squid fishery.

SFAC Charge and Roles and Responsibilities

Katie Grady provided an overview of the SFAC's Charge. The SFAC is charged with reviewing California market squid fishery management and advising CDFW on potential changes to management. CDFW will make final recommendations for any necessary changes to market squid fishery regulations and/or the Fishery Management Plan (FMP) to the Fish & Game Commission (Commission). The SFAC will exist through June 2024 or until otherwise disbanded.

The SFAC will be supported in its role and charge by CONCUR, who will facilitate gathering advice from the SFAC by managing the SFAC meetings, and CDFW, who will review the SFAC's advice and provide recommendations for management changes to the Commission.

Questions from SFAC members and responses from the convening team regarding the SFAC's Charge are summarized below:

- How will input from the SFAC be used? What level of consensus is needed for CDFW to make recommendations for squid fishery management changes to the Fish & Game Commission?

[1] This Key Outcomes Memo recaps key points of presentation and SFAC deliberation. This document is not intended as a transcript; it does not recap discussion in a verbatim manner but rather highlights key themes, areas of emerging agreement, and planned next steps.

The SFAC is an idea-generating body, not a decision-making body. The level of support within the SFAC for ideas is important and we may gauge this throughout the process. CDFW will make decisions based on what it deems necessary for long term, sustainable management of the fishery which will be informed by the SFAC process.

- To what extent will historic work on the squid fishery be used?
  The Squid FMP is robust with many years of development. This process is about evaluating the performance of the FMP and fishery management and will consider historic work.
- How will science be brought into the SFAC process and will there be opportunities to invite specialists in to talk with the SFAC?
  We want to bring the best available scientific information into the SFAC process. The discussion of Empirical Dynamic Modeling is the first opportunity to bring science into the SFAC. There will be an opportunity to bring in relevant specialists and informally workshop ideas with specialists alongside the SFAC process.

Ground Rules and Meeting Protocols

Scott McCreary and Debbie Schechter reviewed the Ground Rules and Meeting Protocols. They noted that the Ground Rules further describe the responsibilities of SFAC members and expectations for their conduct. The intent is for the Ground Rules to be durable throughout the SFAC process and to represent a set of commitments SFAC members make to each other. SFAC members adopted the Ground Rules as proposed. There was no dissent.

An SFAC member suggested that it would be helpful to share contact information for SFAC members. Katie Grady agreed to follow-up.

Key Topics for Discussion

Katie Grady presented a broad overview including background on market squid's natural history, updates on the fishery, existing fishery management and monitoring programs. She also provided an introduction to the discussion topics expected to help structure deliberations of the SFAC. She emphasized that the list of discussion topics is a first cut, and additional topics or refined framing of topics will be brought into later meetings.

Key points regarding natural history, the fishery and management and monitoring programs were as follows:

- Market squid are very short-lived and die after spawning. They are highly responsive to oceanographic changes resulting in large fluctuations in abundance and distribution.

- Market squid range from Baja to southeastern Alaska. The major fishing areas in California are Central California near Monterey and in the Southern California Bight, especially the Northern Channel Islands and off Catalina Island.
- Squid landings are highly variable in both time and space. Historically, most landings were in Southern California but there has been an increase in landings in Monterey corresponding with an increase in warming events. In general, Squid landings taper off in warming events.
- The squid fishery is especially noteworthy as it is the largest fishery in California in terms of both tonnage and value; there is large international market demand. The value of market squid has continued to increase, particularly over the last decade or so.
- The market demand of invertebrates harvested for consumption is growing worldwide. This provides an opportunity to be creative in how we think about management because most of the assessment tools are based on fish dynamics so we can reevaluate what might work for invertebrate fisheries.
- The squid FMP is one of the oldest in the state. Primary management mechanisms are based on catch and effort. There is a seasonal catch limit of 118,000 tons, a restricted access permit program, a 48-hour weekend closure and lighting restrictions. Monitoring is done through the egg escapement method as a proxy for maximum sustainable yield (MSY).
- There are three permit types: seiners, light boats, and brail boats. The primary focus for the SFAC is on seiners and lighting.
- Long-term monitoring of the fishery is built on three CDFW data sets: landings information from dealer tickets, squid logbooks - which include on the water information from vessel operators, and biological sampling at the major ports of landing. Other fishery-independent data sources for monitoring include paralarvae (larval squid) abundance estimates from California Cooperative Oceanic Fisheries Investigations (CalCOFI) and the California Wet Fish Producers Association (CWPA), juvenile abundance estimates from the Juvenile Salmon and Ocean Ecosystem Survey, and oceanographic data such as Sea Surface Temperature.

In summary, Katie noted that the squid fishery has high volume and value with strong market demand, a highly mobile fleet that shifts with the squid distribution and moves northward with warming. For these reasons, the fishery can serve as an ideal case study for exploring climate impacts using a data and experience-driven approach.

An SFAC member cautioned about reliance on landings data and commented that the landings data, which seems to indicate that the resource is moving north, is skewed because it does not account for changes in market conditions. Prior to the mid-1990s, the fishery was market-driven and the market was much smaller.

An SFAC member commented on the use and expansion of CWPA's paralarval sampling and that genetics is now being used for assessing population dynamics of some species and queried whether this approach could be used for squid. Katie responded that the CWPA and CalCOFI are sampling paralarvae but that CDFW does not have its own paralarval or genetic sampling program. Katie included that there is ongoing genetics work on market squid population structure through UCLA and funded by the Ocean Protection Council. An SFAC member commented that the genetic work on squid populations is limited in sample size and scope so a larger, more comprehensive genetic study is needed. This could be an area to explore.

Katie explained that CDFW has identified five major categories of topics, bounded by the scope of the FMP, that will be addressed by the SFAC to evaluate the performance of market squid fishery management. Today's meeting will introduce the topics and the timeframe and CDFW is seeking other ideas, reframing, or restatement of these issues, or other issues and management considerations that stakeholders want to address.

The five categories of topics are:

1. Explore ways to strengthen ***climate resilience*** (this is an overarching topic)
2. Review performance of ***fishery effort controls***
3. Evaluate the fishery logbook program and explore ways to ***modernize data collection***
4. Review ***gear configurations*** and interactions with natural spawning activity
5. Explore how to enhance ***equitable access*** to small-scale fishing operations

Spring and Summer 2023 SFAC meetings will focus on effort controls, available data streams, and EDM.

For each topic category, Katie reviewed some of the ideas that CDFW has heard to-date from stakeholders and requested initial additional ideas from SFAC members.

Fishery Effort Controls: Regarding fishery effort controls, a few SFAC members noted that as the initial list of proposed discussion topics leans heavily in the

direction of more regulation, the ideas listed could imply that the fishery is broken and that effort controls need to be tightened. These members stated that the squid fishery is robust and resilient, as the graphs and charts indicate. One member commented that there is much more value in the fishery but that the demand is not there yet. SFAC members had the following suggestions:

- Consider the policy option that for some topics, no change to effort controls is needed; status quo
- Consider revising the seasonal catch limit upwards if warranted
- Look at the current biomass and how much was caught as opposed to effort controls
- Consider safety impacts of effort controls (e.g., effort controls can lead to a 'race to fish' and can impact safety)
- Be open minded and apply common sense based on actual observations

Katie asked SFAC members to think further about ideas and options around effort controls and be prepared to bring those ideas to the next meeting.

An SFAC member stated that while safety is one logical objective, there are a number of management objectives. This member suggested that the SFAC have a shorter list of guiding management objectives that can be used to frame the SFAC discussions and to ensure that important considerations are included.

Modernize Data Collection: Katie noted that as the SFAC comes up with ideas for innovation and improvement, they will link back to monitoring. Monitoring will be a way to track and see if ideas work and the SFAC will be asked to provide input on what metrics are most useful to track.

Gear Configurations: An SFAC member commented that gear types other than those listed should be added to the discussion. An SFAC member asked what is meant by harvest replenishment area. Katie explained that a harvest replenishment area is a temporary or long-term spatial closure. Marine Protected Areas (MPAs) are considered one type of harvest replenishment area.

Climate Resilience: Katie noted that climate resilience is an overarching theme for all categories. She invited SFAC members to share their view as to what climate resilience means --what does a climate resilient squid fishery look like? This is one of the outcomes that CDFW hopes to achieve from the SFAC process.

Several SFAC members responded. One stated that the fishery is climate resilient because it has the agility to migrate back and forth between different areas. Another stated that the cyclical nature of the fishery, where leaner and high seasons occur one after the other, shows that it is resilient. It is not declining steadily over time but is staying at the same overall level and fluctuates up and

down. Another SFAC member stated that making climate resiliency operational would include the ability to process and move fish to market in the north as well. In response to an SFAC member's question, Katie stated that data on climate impacts such as temperature variances over time would be presented to the SFAC as part of the EDM work.

Katie explained that one of the themes from stakeholder interviews prior to the formation of the SFAC was the need to review and apply current scientific information and analysis. EDM is a scientific tool that can be used to evaluate the performance of fishery management. Management strategy evaluation (MSE), an approach that is becoming more common practice, can be difficult to use for squid because the short squid lifecycle doesn't work well with typical stock assessments like MSE. These methods usually require an "operating" model that considers births and deaths of a population over time. EDM is data-driven and is ideal for short-lived species. The objectives for using EDM to evaluate squid fishery management are to explore fishery and environmental dynamics, forecast landings, and simulate performance of management over time and space.

Introduction to Empirical Dynamic Modeling (EDM)

Katie introduced Stephan Munch, a fisheries ecologist with affiliations at NOAA and UCSC and one of the leading experts on EDM. Working with Stephan on modeling squid data is Lucas Madeiros, a postdoctoral scholar. Stephan provided a presentation to introduce the SFAC to the basic idea and applications of EDM. He explained that standard fisheries models assume a certain relationship between current biomass and new juveniles produced. But the data don't bear this out. Scientists try to make the data fit the models even though there is a lot of variation or noise. Noise can be unpredictable or predictable.

Many factors impact recruitment—size, quality number of eggs; predators, competitors, currents, etc. Scientists have learned a lot about these factors but we can't predict them because we don't have data on them all. A strength of EDM is that it implicitly accounts for unobserved variables using past values (lags) of the observed variables. It predicts what will happen next based on what happened before and gives us a model for the dynamics that is based on the data. So, what looks like noisy data will look less noisy when we include lags to account for the variables we've left out.

EDM has been applied to data from a lot of different species—185 populations with at least 20 years of data. Steve and colleagues found that the EDM model is more accurate than the standard fisheries model for 90% of populations and

the EDM prediction error is 25% less on average. For some, it's a lot less. This is because the prediction error goes down the more generations in a data set. Lags improve the ability to predict recruitment. The noise around the standard models reflects the real biology that was left out. EDM works best for predicting short-lived species because more generations of data are available.

EDM can be used to estimate Maximum Sustainable Yield (MSY). The EDM model can be fit with abundance data and what's happening in the fishery (landings, effort). Effort (or harvest rate) is fixed at some value and then modelled to calculate sustainable yield. This can be done at different efforts/harvest rates to produce the MSY. EDM gets to the correct answer when we know what that answer is.

In summary, EDM accounts for variables omitted from analysis and provides good estimates of harvest benchmarks. It works best for short-lived species such as squid, whereas traditional models perform poorly.

An SFAC member asked why EDM isn't used everywhere if it's better than the traditional models. In response, Stephan noted that it takes time to introduce innovations in resource modeling before new protocols are widely adopted. EDM is beginning to get traction for short-lived invertebrates.

SFAC members were asked to think about questions they have on EDM and bring them to the next meeting.

Public Comment

A member of the public commented that "bongo tows," which are used in the squid paralarvae survey, are an effective tool to show that squid are appropriately managed and suggested that the application of this method be expanded by CDFW to evaluate spawning and egg escapement.

Another commenter recommended that considering regional areas for additional closures could be a promising policy option.

Another commenter expressed that the fishery runs well; status quo should be considered as a policy option relative to fishing effort.

SUMMARY, NEXT MEETING, NEXT STEPS

Scott McCreary expressed appreciation for the observations and contributions of SFAC members and explained that the ideas around issues and other key points of conversation will be included in a meeting summary. CONCUR will produce a draft meeting summary for review by the convening team and

subsequent distribution to SFAC members for "red flag" review, with an invitation to propose corrections or note important omissions.

Katie Grady also appreciated the thoughts from SFAC members and stated that one of the purposes of the SFAC is to test the FMP to see whether it is robust. She noted that the next SFAC meeting will be in person in late March or April in the Monterey area and that a date will be selected soon. The next meeting will review the performance of fishery effort controls and inform EDM as a collaborative process. A more detailed presentation on EDM will be provided. Additionally, the overarching theme of exploring ways to strengthen fishery climate resilience will continue.

Based on the Convening Team's deliberations, the following next steps were identified:

SFAC Members:

- If you would not like your contact information to be shared with other SFAC members, please contact sfac@wildlife.ca.gov or katie.grady@wildlife.ca.gov.
- Think about questions you have about EDM and how it will be applied to the squid fishery management review, in preparation for the next meeting.
- Consider whether additional topics should be included under the category of fishery effort controls, in preparation for the next meeting.
- Review draft meeting summary and proposed bounded edits to address key misstatements or omissions.

Facilitation Team/Conveners:

- Prepare and distribute draft meeting summary for review by SFAC members.
- Distribute schedule of upcoming SFAC meetings.
- Distribute roster of SFAC members.
- Share meeting materials and presentations.

For questions regarding this meeting summary, please contact sfac@wildlife.ca.gov or katie.grady@wildlife.ca.gov and Scott McCreary at scott@concurinc.net.